

SOME STANDARD DIAGNOSTIC TESTS

| Substance Tested | Diagnostic Test |
|----------------------------|--|
| water | If cobalt(II) chloride paper is exposed to a liquid or vapor, and the paper turns from blue to pink, then water is likely present. |
| oxygen | If a glowing splint is inserted into the test tube, and the splint glows brighter or relights, then oxygen gas is likely present. |
| hydrogen | If a flame is inserted into the test tube, and a squeal or pop is heard, then hydrogen is likely present. |
| carbon dioxide | If the unknown gas is bubbled into a limewater solution, and the limewater turns cloudy, then carbon dioxide is likely present. |
| halogens | If a few millilitres of a chlorinated hydrocarbon solvent is added, with shaking, to a solution in a test tube, and the color of the solvent appears to be <ul style="list-style-type: none"> • light yellow-green, then chlorine is likely present. • orange, then bromine is likely present. • purple, then iodine is likely present. |
| acid | If strips of blue and red litmus paper are dipped into the solution, and the blue litmus turns red, then an acid is present. |
| base | If strips of blue and red litmus paper are dipped into the solution, and the red litmus turns blue, then a base is present. |
| neutral solution | If strips of blue and red litmus paper are dipped into the solution, and neither litmus changes color, then only neutral substances are likely present. |
| neutral ionic solution | If a neutral solution is tested for conductivity with a multimeter, and the solution conducts a current, then a neutral ionic substance is likely present. |
| neutral molecular solution | If a neutral solution is tested for conductivity with a multimeter, and the solution does not conduct a current, then a neutral molecular substance is likely present. |

There are thousands of diagnostic tests. You can create some of these, using data from the periodic table (inside front cover of this book); and from the data tables in Appendix F, pages 608 to 611, and on the inside back cover.

ION COLORS

| Ion | Flame Color | Ion | Solution Color |
|------------------|----------------------------------|--|----------------|
| Li ⁺ | bright red | Groups 1, 2, 17 | colorless |
| Na ⁺ | yellow | Cr ³⁺ | blue |
| K ⁺ | violet | Cr ³⁺ | green |
| | | Co ²⁺ | pink |
| Cd ²⁺ | yellow-red | Cu ⁺ | green |
| Sr ²⁺ | bright red | Cu ²⁺ | blue |
| Ba ²⁺ | yellow-green | Fe ²⁺ | pale green |
| | | Fe ³⁺ | yellow-brown |
| Cu ²⁺ | blue (halides) green (others) | Mn ²⁺ | pale pink |
| | | Ni ²⁺ | green |
| Pb ²⁺ | light blue-grey | CrO ₄ ²⁻ | yellow |
| Zn ²⁺ | whitish green | Cr ₂ O ₇ ²⁻ | orange |
| | | MnO ₄ ⁻ | purple |